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INFLATION AND THE SIZE DISTRIBUTION OF FARMS

By

Eldon E. Weeks

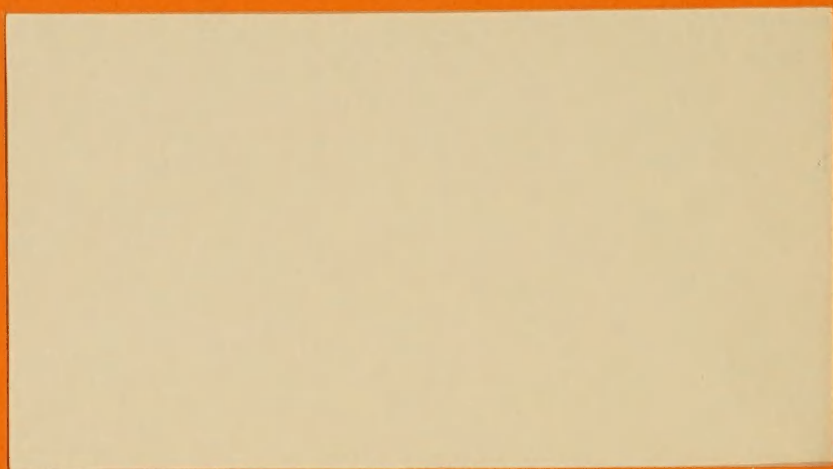
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# Joint Planning and Evaluation Staff Paper

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Eldon E. Weeks

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The views expressed here are those of the author and do not necessarily reflect the position of the Science and Education Administration or the United States Department of Agriculture.



## PREFACE

Recently expressed concerns over the structure of agriculture have led to efforts to reassess where we are in our knowledge of the facts describing the structure of the industry. The size distribution of farms is one of the important descriptive facts of the industry. Currently published statistics, which show the size distribution of farms as measured by the value of sales, reveal that small farms are disappearing faster than all farms. But these statistics are published with sales measured in current dollars, and there has been considerable price inflation in the last decade. This paper reports an effort to ascertain changes in the distribution of farms by size when the metering device is standardized.

Most forecasters foresee continuing inflation. Therefore, a quick and convenient procedure for estimating the effects of inflation would be a useful tool in attempts to monitor real changes in the size distribution of farms for various reasons.

Appreciation for the assistance of a number of people is acknowledged. Charles Cobb of ESCS-Economics, was a willing consultant on the technical properties of published farm size distribution estimates. William Lin and Lyle Schertz, of the same organization, reviewed an earlier draft of this paper. The comments of David Dyer, Yao-Chi Lu, James Hall, and J. M. Brazzel, all of SEA-JPE, were particularly valuable. The author, however bears full responsibility for any remaining errors.

Eldon E. Weeks  
Beltsville, Maryland  
April, 1980





## INFLATION AND THE SIZE DISTRIBUTION OF FARMS

### EXECUTIVE SUMMARY

The purpose of this paper is to report an attempt to identify the nominal impact of inflation on the redistribution of farms by size between 1969 and 1977, using readily available statistics and quick, simple procedures.

According to estimates developed for this report, inflation was the dominant cause for gains in the number of farms with more than \$40,000 of sales and for losses in the number of farms with sales of less than \$5,000 between 1969 and 1977. Farms with sales between \$5,000 and \$40,000 declined in number, with declines for reasons other than inflation more than offsetting modest increases due to inflation.

Total sales are reduced for each of the categories of farms with \$40,000 or more of sales and increased for all other categories after adjustment for inflation. In 1977 before adjustment for inflation, the 6 percent of all farms with \$100,000 or more of sales accounted for 52.6 percent of industry sales; the 24.8 percent of farms with \$20,000 to \$100,000 of sales accounted for 36.7 percent of industry sales; and the 69.2 percent of farms with less than \$20,000 of sales accounted for 10.7 percent of industry sales. After adjustment for inflation, the 3.0 percent of all farms with \$100,000 or more of sales accounted for 40.4 percent of industry sales; the 16.6 percent of farms with \$20,000-\$100,000 of sales accounted for 38.8 of industry sales; and the 80.4 percent of farms with less than \$20,000 of sales accounted for 20.8 percent of industry sales.

It is recommended that improved means of estimating the effects of inflation be developed and that statistical series on inflation-adjusted farm size distributions be published regularly.



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# INFLATION AND THE SIZE DISTRIBUTION OF FARMS

## INTRODUCTION

The size distribution of farms is one of the key observation points for describing the structure of agriculture, and changes in the size distribution of farms are thought to be causally determined effects which can be explained. Many factors have been mentioned recently as contributing to the decline in the number of farms in the U.S. and to the increasing concentration of large farms. These factors include the structure of tax programs, increasing establishment size and firm concentration in the marketing and input supplying industries, increasing nonfarmer control over farm resources, technological change favoring large farms, farm programs, and impacts of a range of farm-related nonfarm programs.

If, indeed, these and other factors do cause significant changes in the size distribution of farms, it would take a very complex study to estimate the separate effects of each and the collective effects of all.

In the 1970's there has been considerable price inflation of goods and services farmers buy and sell. The most frequently utilized manner of showing changes in the size distribution of farms has been to make inter-year comparisons of the number of farms, total value of output, and cash receipts per farm by value of sales class groups of farms. The farm value of sales class distributions commonly used are those published by ESCS in its Farm Income Statistics.<sup>1/</sup> These are stated in current dollars within fixed dollar value boundaries.

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<sup>1/</sup> U.S. Department of Agriculture; Economics, Statistics, and Cooperatives Service; Statistical Bulletin No. 609, July 1978.





## Purpose

The main purpose of this short paper is to present an estimation of the effects of inflation on changes in distributions of the number of farms, total value of farm product sales, and cash receipts per farm by value of sales class between 1969 and 1977. The removal of these inflationary effects should yield some perspective on the magnitude of changes in farm size distribution due to all other causes.

A second purpose is to estimate the effects of inflation on the size distribution of farms using an easy and quick estimating method. The distributional effects of inflation or deflation between any desired years of reference could then be approximated quickly, using only a hand calculator and readily available data.

## Scope

The data used and the estimates developed in this paper are confined to 1969, 1977, and changes between 1969 and 1977. This time period covers nearly a decade of very rapid changes in both price levels and farm size distributions. Estimations and analyses are limited to the effects of change in the Index of Prices Received by Farmers on distributions of farm numbers, total value of sales, and cash receipts per farm by farm value of sales class. By using the assumptions and computational procedures outlined below, these three measures are mutually related to each other. To use similar procedures for estimates of associated changes in the distribution of farm production expenses and income would amount to unintended expansion of scope to include additional issues of both substance and estimation procedure.

The changes referred to in the preceding paragraph include only the nominal changes in distributions directly affected by inflation. Certain "real" changes that occurred in these distributions may also have been at least partially



prompted by inflation, but were not addressed here because of the additional time and resources required for their identification and analysis. Inflation might have been included among causes for "real" distributional changes through several avenues, including but not limited to the following. Prices farmers paid might have increased more than prices farmers received. The resulting pressure on farm income might induce some farmers to: (1) stop farming and sell out; (2) stop farming and rent their land out; and (3) stop farming and just keep their land idle. On the other side, some farmers might: (1) seek to acquire more land through purchase or rental arrangements, possibly by leveraging inflation-related capital gains; or (2) adopt new technologies which require more capital and land to achieve anticipated economies of size and/or economies of asset utilization.

Finally, certain implications come to mind as a result of the estimates presented below. These will be mentioned but not pursued in depth in this paper.

### Plan

In the next section of this paper, the author will undertake a brief two part discussion on estimating the effects of inflation on the size distribution of farms. One part consists of an acknowledgment of the interest of others and how they addressed the subject. The second part is an outline of the computational steps used in this exploration. Then the size distribution of farms for 1969 and 1977 will be presented.

The third section of the paper will contain a presentation and discussion of distributional inflation adjustment estimates and discussion of the inflation adjusted farm distributions. Finally, there are statements of conclusions and implications about the effects of inflation on the changing size distribution of farms.





## ESTIMATING THE EFFECTS OF INFLATION

### The Work of Others

Keeping track of the effects of inflation on the redistribution of farms by size does not seem to have been an item of high priority in recent years. However, the topic now seems quite relevant in view of the high profile of the structure of agriculture among policy issues. Relying only on his recollection, the author observes that the literature isn't rich in the subject area of inflation and changes in the distribution of farms by size. Nevertheless, it wasn't necessary to conduct a literature search to discover that at least a few people have addressed the subject recently.

B. F. Stanton used the Consumer Price Index to deflate gross farm sales.<sup>2/</sup> He observed that a "commercial" farm selling \$20,000 or more of output in 1977 would be equivalent to a farm selling \$10,000 or more of output in the early 1960's. Then he observed that the number of "commercial" farms, on a constant dollar basis has remained relatively stable since the early 1960's.

While the Stanton paper illustrates the distortions introduced in interpreting "commercial" farm numbers expressed in current dollars, it falls short of showing the migration of farms up a size class array.

In the Spring of 1974, Charles Cobb, then of the National Economics Division of the Economic Research Service explored a methodology for estimating the effects of inflation from changes in the size distribution of farms as measured by value of sales. It amounted to utilization of price and output data from several consecutive Censuses. The work was not undertaken.

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<sup>2/</sup> "Some Political Arithmetic of Large and Small," a paper presented at The meetings of the Northeastern Agricultural Economics Council, University of Delaware, June 20, 1979.



William Lin of the National Economics Division, ESCS, USDA has a Technical Bulletin manuscript in process. In this manuscript, he reports projections of the size distribution of farms to the year 2000 using Markhov Chain techniques and comparing, checking, or augmenting the results with those obtained by cohort analysis and other procedures. Lin used Census of Agriculture and Census of Population data. He adjusted the Census of Agriculture data for under-enumeration of farms. This is a much more extensive research effort than that reported below.

#### Estimation Procedure

The method employed here involves simple manipulation of existing published data. While the results may not be as professionally refined as they would be if obtained by a research effort involving other methods, they should still yield a general perspective on the nominal effects of inflation on changes in farm size distribution.

The problem is interpreted to be one of estimating, for each size class of farms, the number of farms and total sales in the 1969 distributions that would remain in the same size class if prices received were to be expressed in 1977 dollars. When these are subtracted from the published estimates for 1969, the results represent estimates of farms and sales that would migrate to a size class of larger farms. This problem consists of two parts. First is a characterization of the distribution of farms by size within size classes and identification of those that would migrate between size classes with inflation as noted above. Second is selection of which distribution to adjust. Should the 1969 distribution be adjusted to 1977? The first part, as noted below, is handled by assumption, and for the second part, both distributions are adjusted and reconciled.





The operational steps used for estimating the number of farms and value of sales that migrated from the \$100-200 thousand size class of farms into the \$200 thousand and over category because of inflation between 1969 and 1977 are used below to illustrate the estimation procedures.

Assumption: The total 1969 value of sales for the size class is a constant. This means that an inverse relationship exists between possible mean cash receipts per farm and number of farms in the size class. It also implies an assumption that farm number density increases as cash receipts per farm become smaller. Observe in table 1, for example, that size class ranges are reduced by one-half in most cases as farms become smaller and in no case does the number of farms decline at that rate. It is easily seen that the number of farms per thousand dollars of range in a size class is always greater than a similar ratio representing larger farm size classes. Thus the assumption that farm density increases as farms become smaller within any size class appears better than an assumption that farms are evenly distributed within size classes.

Following the above assumption, specific computational steps are noted below.

1. All farms with cash receipts of \$116,959 or more would move to the next larger size category. This is given by  $\frac{\$200,000}{1.71}$ , where \$200,000 is the upper bound of the size class and 1.71 is the index of prices received by farmers in 1977.<sup>3/</sup>

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<sup>3/</sup> Change in the index of prices received by farmers for all farm products is taken to be a measure of inflation. The index of prices received by farmers is published in United States Department of Agriculture, Agricultural Statistics, 1979, United States Government Printing Office, Washington: 1979, p. 452. If this index is divided by 107, its value in 1969, the base of the index is shifted to 1969=1.0 and the reading for 1977=1.71 (inflation has this increased prices received by farmers from 1.0 in 1969 to 1.71 in 1977).



2. The number of farms remaining in the category is 7,621, given by  

$$\frac{\$5,256}{\$100,000} \text{ mil.} - \frac{\$5,256}{\$116,959} \text{ mil.} = 7,621.$$
3. The mean of cash receipts for farms remaining in the category (\$108,480) is obtained by  $\frac{\$100,000 + \$116,959}{2}$ . Steps 2 and 3 also represent ad hoc estimations reflecting the observation of increasing farm numbers as farms become smaller.
4. The value of sales for all farms remaining in the category (\$826.7 mil.) is estimated by  $7,621 \times \$108,480$ .
5. The number of farms moving to the next category (27,379) is calculated by  $35,000 \text{ (Table 1)} - 7,621$ .  
 The value of sales shifted to the next category by inflation (\$4,429.3 mil.) is estimated by  $\$5,256 \text{ mil.} - \$826.7 \text{ mil.}$

The Size Distribution of Farms by Value  
of Sales Class, 1969 and 1977

The cardinal and relative distribution of farm numbers and total value of sales class for 1969 and 1977 are shown in table 1. Cash receipts per farm are also shown, as well as 1977 as a percent of 1969 for the number of farms, total value of sales, and cash receipts per farm.

Observation of data shown in table 1 leaves no room for doubt that the number of farms and the total value of farm product sales became increasingly concentrated in the larger farm size class between 1969 and 1977. The number of farms in each of the 2 size categories with sales per farm greater than \$100,000 increased by more than 200 percent, with corresponding increases in total sales by farms in those size classes. At the same time, both farm numbers and total sales in each size class below \$20,000 of cash receipts per farm (small farms) declined. Farms selling more than \$100,000 worth of output increased from 1.7 percent to 6.0 percent of all farms and their sales increased from 31.0 to 52.6



Table 1. Number of farms, value of sales, and cash receipts per farm by value of sales class, 1969 and 1977\*

Value of Sales Class	Number of Farms			Value of Sales			Cash Receipts per Farm		
	1969		1977 as Percent of 1969 Percent	1969		1977 as Percent of 1969 Percent	1969		1977 as Percent of 1969 Percent
	Thousand	Thousand		M\$1 Dol	M\$1 Dol		Dollars	Dollars	
\$200,000 and over	16	55	343.8	11,008	35,357	321.2	688,000	642,855	93.4
\$100,000 to \$199,999	35	107	305.7	5,256	16,867	320.9	150,171	157,636	105.0
\$40,000 to \$99,999	170	348	204.7	11,506	25,469	221.4	67,682	73,186	108.1
\$20,000 to \$39,999	330	321	97.3	10,770	11,089	103.0	32,636	34,545	105.8
\$10,000 to \$19,999	400	311	77.8	6,917	5,409	78.2	17,294	17,392	100.6
\$5,000 to \$9,999	413	302	73.1	3,647	2,697	74.0	8,831	8,931	101.1
\$2,500 to \$4,999	436	304	69.7	1,893	1,351	71.4	4,343	4,443	102.3
Less than \$2,500	1,200	958	79.8	1,535	1,211	78.9	1,279	1,264	98.8
All Farms	3,000	2,706	90.2	52,532	99,450	189.3	17,511	36,752	209.9
Percent Distribution									
\$200,000 and over	0.5	2.0	-	21.0	35.6	-	-	-	-
\$100,000 to \$199,999	1.2	4.0	-	10.0	17.0	-	-	-	-
\$40,000 to \$99,999	5.7	12.9	-	21.9	25.6	-	-	-	-
\$20,000 to \$39,999	11.0	11.9	-	20.5	11.1	-	-	-	-
\$10,000 to \$19,999	13.3	11.5	-	13.2	5.4	-	-	-	-
\$5,000 to \$9,999	13.8	11.2	-	6.9	2.7	-	-	-	-
\$2,500 to \$4,999	14.5	11.2	-	3.6	1.4	-	-	-	-
Less than \$2,500	40.0	35.3	-	2.9	1.2	-	-	-	-
All Farms	100.0	100.0	-	100.0	100.0	-	-	-	-

\* Source: USDA, ESCS, Statistical Bulletin No. 609, Washington, D.C. 20250, July 1978.





percent of the industry total between 1969 and 1977. Small farms decreased from 81.6 percent to 69.2 percent of all farms and their share of industry sales dropped from 26.6 percent to 10.7 percent.

## RESULTS

The results presented below are obtained by applying the procedures outlined above to the data shown in table 1. First the adjustment estimates calculated from the 1969 distributions are presented. Then the 1969 and 1977 inflation-adjusted distributions are shown and discussed.

### Distributional Adjustment Estimates

The steps outlined above were used to calculate inflation adjustment estimates from the 1969 distribution of farms by value of sales class for the number of farms and total sales. These are shown in table 2. The 1969-77 inflation adjustment estimates shown in table 2 are presented as adjustments to be added to the 1969 distributions to show what these distributions would look like in 1977 after adjustment for the nominal effects of inflation. The adjustment estimates shown in table 2 can also be used to remove the estimated nominal effects of inflation from the 1977 distributions of farms and total sales. This application of the estimates would simply require reversal of the Add and Subtract column headings over the first two pairs of columns and reversal of the signs in the Net Adjustment columns.

According to the estimates shown in table 2, all size classes of farms with sales greater than \$5,000 in 1969 would gain in number of farms as a result of correction for the inflation occurring between 1969 and 1977. The total gain in these size categories was shifted to losses in the 2 categories representing farms with less than \$5,000 in sales per farm. The 3 categories representing farms with sales of \$40,000 or more increased total sales amounting to \$9.1 billion at the expense of farms in lower size groups.



Table 2. 1969-1977 Inflation adjustment estimates for number of farms, cash receipts per farm and total sales by farm value of sales class in 1969.

Size Class of Farm	Add		Subtract		Net Adjustment	
	No. of farms Thousand	Total Sales 1969 Mil Dol	No. of farms Thousand	Total Sales 1969 Mil Dol	No. of farms Thousand	Total Sales 1969 Mil Dol
\$200,000 and over	27	4,429	-	-	+27	+4,429
\$100,000 to \$199,999	79	7,030	27	4,429	+52	+2,601
\$40,000 to \$99,999	252	9,076	79	7,030	+173	+2,046
\$20,000 to \$39,999	300	5,829	252	9,076	+48	-3,247
\$10,000 to \$19,999	307	3,073	300	5,829	+7	-2,756
\$5,000 to \$9,999	326	1,595	307	3,073	+19	-1,478
\$2,500 to \$4,999	161	319	326	1,595	-165	-1,276
Less than \$2,500	-	-	161	319	-161	-319



### Inflation-Adjusted Distributions

Now let's observe the distributions of farm numbers, total sales, and cash receipts per farm by value of sales class after adjustment for the effects of inflation between 1969 and 1977. Farm numbers and total sales are shown for 1969 and 1977, as are the total differences between the two years. The total differences are apportioned into changes due to the nominal effects of inflation and those due to other reasons. Then the corrected 1969 and 1977 distributions are shown in the last two columns.

### Farm Distributions

The distributions of farms by value of sales class for 1969 and 1977 and the differences between them are shown in the first 3 columns of table 3. Estimated changes due to inflation and to other reasons are shown in the next 2 columns. The estimated changes due to inflation are those shown in table 2 for the number of farms. Changes due to other reasons are residuals resulting from algebraic subtraction of changes due to inflation from the total change between 1969 and 1977. Lastly, the 1969 and 1977 distributions of farms corrected for inflation are shown.

The three categories with cash receipts per farm of \$40,000 or more gained significantly in the number of farms between 1969 and 1977. All categories with sales of less than \$20,000 per farm lost significant numbers of farms. These observations are true in terms of both actual farm numbers and the distribution proportions.

When one is asked to show the nominal effects of inflation on the size distribution of farms, he can fairly respond in two ways. One way is to remove the estimated effects of inflation from the more recent year to show what the distribution would be without the inflationary impact. The other way is to add the estimated inflationary impact to the distribution for the earlier year to





Table 3. Distributions of farms by value of sales class, 1969 and 1977 with changes due to nominal impacts of inflation since 1969 and other reasons.

Value of Sales Class	Number of Farms (Thousand)		Total Change 1969-1977	Change due to:		1977 Corrected for Inflation	1969 Adjusted for Inflation
	Actual 1969	Actual 1977		Inflation	Other Reasons		
\$200,000 and over	16	55	+39	+27	+12	28	43
\$100,000 to \$199,999	35	107	+72	+52	+20	55	87
\$40,000 to \$99,999	170	348	+178	+173	+5	175	343
\$20,000 to \$39,999	330	321	-9	+48	-57	273	378
\$10,000 to \$19,999	400	311	-89	+7	-96	304	407
\$5,000 to \$9,999	413	302	-111	+19	-130	283	432
\$2,500 to \$4,999	436	304	-132	-165	+33	469	271
Less than \$2,500	1,200	958	-242	-161	-81	1,119	1,039
All Farms	3,000	2,706	-294	0	-294	2,706	3,000
<u>Percent Distribution</u>							
\$200,000 and over	0.5	2.0	-	-	-	1.0	1.4
\$100,000 to \$199,999	1.2	4.0	-	-	-	2.0	2.9
\$40,000 to \$99,999	5.7	12.9	-	-	-	6.5	11.4
\$20,000 to \$39,999	11.0	11.9	-	-	-	10.1	12.6
\$10,000 to \$19,999	13.3	11.5	-	-	-	11.2	13.6
\$5,000 to \$9,999	13.8	11.2	-	-	-	10.5	14.4
\$2,500 to \$4,999	14.5	11.2	-	-	-	17.3	9.0
Less than \$2,500	40.0	35.3	-	-	-	41.4	34.7
All Farms	100.0	100.0	-	-	-	100.0	100.0



show what it would look like if no changes other than inflation had occurred in the intervening years. The results of both approaches are shown in the last two columns under the percentage distribution in table 3.

Adjustment of the 1977 distribution of farms for the nominal effects of inflation since 1969 results in a downward adjustment of farm numbers in all categories except the two made up of farms with less than \$5,000 of sales. Large farms, \$100,000 or more in sales, were adjusted downward from 162,000 to 83,000 farms, or from 6.0 to 3.0 percent of all farms. Farms with sales between \$20,000 and \$100,000 are adjusted downward from 669,000 to 448,000, or from 24.8 to 16.6 percent of all farms. Small farms, on the other hand, were adjusted from 1,875 thousand to 2,175 thousand with most of the net adjustment occurring in the number of farms with less than \$5,000 of sales. The proportion of small farms to all farms changed from 69.2 to 80.4 percent.

Adjustment of the 1969 distribution of farms for the nominal effects of inflation to 1977 results in an upward adjustment in farm numbers in all categories except the two which consist of farms with less than \$5,000 of sales. The number of large farms is increased from 51,000 to 130,000, or from 1.7 to 4.3 percent of all farms. Farms with sales between \$20,000 and \$100,000 are adjusted from 500,000 to 721,000, or from 16.7 to 24.0 percent of all farms. Small farms were adjusted from 2,449 thousand to 2,149 thousand, or from 81.6 to 71.7 percent of all farms.

The reader is cautioned against trying to interpret the estimates shown in table 3 too strictly. The inflation adjustment estimates were obtained by making assumptions about the distributions of farms within size groups. The author believes the estimates have general observational validity for supporting statements about the kinds of effects of inflation on the size distribution of farms. But they may not be sufficiently accurate to support statements about



the exact levels of effects for each size group of farms. With this caution in mind, the author prefers to observe the inflation-adjusted 1977 distribution rather than the inflated 1969 distribution. He thinks, given the object of this paper, that it is simply easier to comprehend the differences in current distributions with and without the nominal effects of inflation than it is to comprehend these effects by inflating a prior distribution.

Even recognizing these weaknesses in estimating methods, the changes in the distribution of farms due to reasons other than inflation are at least as interesting as those that are due to inflation (table 3). For reasons other than inflation, the 3 categories of largest farms gained 38,000 farms and the \$2,500 to \$5,000 sales class category gained 33,000 farms. These gains, however, were more than offset by the loss of 364,000 farms in the other 4 sales class categories for a total decline of 294,000 farms. In all categories with farm sales between \$2,500 and \$40,000 the direction of change in farm numbers for other reasons appears to be opposite to the direction of change due to inflation. And for 3 of these categories, the changes due to other reasons more than offset the changes due to inflation. The procedures reported here do not permit examination of the order of dominance involving the reasons for change other than inflation.

#### Sales Distributions

The distributions of total sales by value of sales class for 1969 and 1977 and the differences between them are shown in the first 3 columns of table 4. Estimated changes due to inflation and to other reasons are shown in the next 2 columns. Next, the 1977 distribution corrected for inflation is shown. All dollar values are expressed in 1969 dollars. The cash receipts per farm shown in table 4 are also expressed in terms of 1969 dollars. They include those





Table 4. Distributions of sales by farm value of sales class, 1969 and 1977 with changes due to nominal impacts of inflation on the distribution of farm sales

Value of Sales Class	Actual 1969	Total Value of Sales (Millions of 1969 dollars)		Change due to:		1977 Corrected for Inflation	Cash Receipts per Farm (1969 Dollars)	
		Actual 1977	Change 1969-1977	Inflation	Other		Actual 1969	Actual 1977 Corrected for Inflation
\$200,000 and over	11,008	20,677	+9,669	+4,429	+5,240	16,248	688,000	375,939
\$100,000 to \$199,999	5,256	9,864	+4,608	+2,601	+2,007	7,263	150,171	92,185
\$40,000 to \$99,999	11,506	14,894	+3,388	+2,046	+1,342	12,848	67,682	42,799
\$20,000 to \$39,999	10,770	6,485	-4,295	-3,247	-1,038	9,732	32,636	20,202
\$10,000 to \$19,999	6,917	3,163	-3,754	-2,756	-998	5,919	17,294	10,171
\$5,000 to \$9,999	3,647	1,577	-2,070	-1,478	-592	3,055	8,831	5,223
\$2,500 to \$4,999	1,893	790	-1,103	-1,276	+173	2,066	4,343	2,598
Less than \$2,500	1,535	708	-827	-319	-508	1,027	1,279	739
All Farms	52,532	58,158	+5,626	-	+5,626	58,158	17,511	21,492
Percentage Distribution								
\$200,000 and over	21.0	35.6	-	-	-	27.9	-	-
\$100,000 to \$199,999	10.0	17.0	-	-	-	12.5	-	-
\$40,000 to \$99,999	21.9	25.6	-	-	-	22.1	-	-
\$20,000 to \$39,999	20.5	11.1	-	-	-	16.7	-	-
\$10,000 to \$19,999	13.2	5.4	-	-	-	10.2	-	-
\$5,000 to \$9,999	6.9	2.7	-	-	-	5.3	-	-
\$2,500 to \$4,999	3.6	1.4	-	-	-	3.5	-	-
Less than \$2,500	2.9	1.2	-	-	-	1.8	-	-
All Farms	100.0	100.0	-	-	-	100.0	-	-



published for 1969, those published for 1977 after deflation by the index of prices received by farmers, and those calculated for 1977 using inflation-corrected farm numbers and total sales.

Inflation adjustments for total sales by value of sales class of farms follow the same pattern as did the adjustments in farm numbers. Total sales are reduced for each of the categories of farms with \$40,000 or more of sales and increased for all other categories. In 1977, large farms (\$100,000 or more of sales) accounted for 52.6 percent of industry sales, farms with sales of \$20,000 to \$100,000 accounted for 36.7 percent, and small farms 10.7 percent. After correction for inflation, the comparable figures are 40.4, 38.8, and 20.8 percent, respectively.

Except for one instance, the direction of change in the distribution of sales due to reasons other than inflation was the same as the direction induced by inflation. For all but the largest and smallest size classes, inflation was a stronger force in the redistribution of sales than were other reasons.

The calculation of cash receipts per farm from the inflation-adjusted farm numbers and total sales provides an intuitive check on the assumption and procedures used to make those adjustments. The first thing one notices as he looks at the fully adjusted cash receipts per farm is that it is, for the \$5,000-\$9,999 size class, above the limits for the category. And for the size classes on either side of that one, the mean cash receipts is pushing the upper boundary. Reference to table 1 indicates that for these size classes the mean, expressed in current dollars, is quite near the upper boundary of the range for each. If one can accept the idea that a 10-20 percent error in each estimate may exist and the distributional pattern still have some general validity, the estimates presented in this paper appear to have some utility in characterizing the nominal impacts of inflation on the size distribution of farms. One could,



of course, resort to a much more rigorous research effort or, alternatively introduce intuitive reasonability criteria for each size class of farms. The former would require more time and resources, and the latter means departure from a one-method standard to achieve "reasonable" results.

### CONCLUSIONS

Concern has recently been expressed over the structure of agriculture. One of the key indicators of the changing structure of agriculture is the changing size distribution of farms with increasing concentration in the number of large farms. But two related factors make it difficult to detect the real changes in farm size distribution. One is that the readily available statistical series are expressed in current dollar terms. The other is that there has been a considerable amount of inflation in the last decade. Lacking statistical series deflated to constant dollars on flow measures of farm size distribution, several people have noted the fact or possibility that inflation is an important agent in farm size redistribution, and at least one research effort is to be reported soon.

The purposes of this paper are to report an attempt to estimate the effects of inflation on the size distribution of farms, as expressed by farm numbers and value of sales, and to devise a procedure for doing so that involves only a hand calculator and a day or two of time.

The procedure developed and reported here is principally an attempt to identify nominal changes in the size redistribution of farms due to inflation in prices received by farmers when the distributions of farms within 8 different size classes are unknown. Intuitive indications lead the author to believe that one must be able to accept estimation errors in the magnitude of 10-20 percent before the results reported here can be judged useful. The procedure probably





precludes error randomness for individual cases. An error in one estimate will cause an error in another estimate. Thus the pattern of estimates may have meaning even though individual estimates are perceived to contain errors. Lacking information obtained through superior procedures, the author believes the results reported here are generally useful even though the reader is cautioned against interpreting individual estimates too literally.

According to the estimation procedure used here, inflation has been the dominant cause of increase in the number of farms with sales of \$40,000 or more between 1969 and 1977. Inflation has also been the dominant force in the decline of the number of farms with sales of \$5,000 or less in the same period. Reasons other than inflation, however, appear dominant in explaining the decline in the number of farms with sales between \$5,000 and \$20,000.

Compared to the distribution of farms, less can be generalized about the pattern of change in the distribution of total sales by farm value of sales class as a result of inflation between 1969 and 1977. For the 3 size classes of farms with sales between \$5,000 and \$40,000, inflation adjustments result in substantial increases in total sales even though modest declines in farm numbers as a result of inflation are indicated. In two of these three size classes, the calculation of cash receipts per farm yield figures very close to or above the upper boundary of the size class. As reported here, inflation dominated distributional changes in the value of sales by farm value of sales class between 1969 and 1977 except for the categories of the largest and smallest farms.

#### IMPLICATIONS AND RECOMMENDATIONS

Distributional change in the farm size structure is inevitably related to performance expectations and norms for factor ownership and control in the industry. Perception of "real" change in the distribution of farms by size is



blurred by the considerable amount of inflation that has occurred during the 1970's. Attribution of the causes of "real" change cannot occur without identification of at least some of the major impacts of inflation. Thus this paper reports a very rushed attempt to shed general light on the nominal effects of inflation in redistributing farms by size.

By definition, inflation usually means a rise in the general level of prices. There can be a number of causes for inflation, and each may affect the structure of agriculture differentially. Also, policy measures to combat inflation probably will affect the structure of the industry. Inflation, depression, and stagflation are often thought to be conditions prompted by one or more reasons for systemic disequilibrium. Disequilibrium events of this kind usually affect various sectors differently, depending on a number of specific circumstances. Initially, perhaps only nominal effects may be observed or felt. Then attempts to "manage" in a disturbed environment probably will add to induced "real" changes in structural situations. The stated objectives of this paper are very limited, and it is hoped that a major result will be increased attention to the study of inflationary pressures on the structure of the food and agricultural economy. At the very least, ongoing perceptions of "real" change in the size structure of farms would be enhanced by construction and maintenance of statistical series on farm size distribution characteristics after corrections for the nominal effects of inflation.

It might be useful to describe scenarios incorporating inflation different kinds and, within them, analyze the implications for the performance of agriculture. From this kind of analysis, forecasts could be incorporated into the scenarios used for planning science programs.







